

CLAIMS

What is claimed is:

1. A light emitting diode (LED) lamp for mounting to an existing fixture for a fluorescent lamp having a ballast assembly including ballast opposed electrical contacts, comprising:

- a tube having tube ends,
- at least one LED positioned within said tube between said tube ends,
- electrical circuit means for providing electrical power from the ballast assembly to said at least one LED,
- means for electrically connecting said electrical circuit means with the ballast opposed electrical contacts,
- said electrical circuit means including an LED electrical circuit including at least one electrical string positioned within said tube and generally extending between said tube ends, said at least one LED being in electrical connection with said at least one electrical string,
- said at least one LED being positioned to emit light through said tube,
- means for supporting and holding said at least one LED and said LED electrical circuit,
- means for suppressing ballast voltage being delivered from the ballast assembly, said means for suppressing ballast voltage being in electrical connection with said electrical circuit means, and
- means for controlling the delivery of said electrical power from said ballast assembly to said at least one LED.

2. The LED lamp in accordance with claim 1, wherein said means for controlling includes an on-off switch positioned in said LED lamp on said electrical circuit in operative association with said at least one LED, said switch being operable between an on mode wherein electrical power is delivered to said at least one LED and an off mode wherein said electrical power is not delivered to said at least one LED.

3. The LED lamp in accordance with claim 2, further including a manual control unit positioned external to said tube in signal communication with said switch, said manual control unit being manually operable between an activation mode wherein a control signal is sent to said switch to activate said switch to said on mode and a deactivation mode wherein a control signal is sent to said switch to deactivate said switch to said off mode.

4. The LED lamp in accordance with claim 3, further including a control signal path from said manual control unit to said switch.

5. The LED lamp in accordance with claim 4, wherein said control signal path comprises a control signal line wire.

6. The LED lamp in accordance with claim 4, wherein said control signal path comprises a wireless signal.

7. The LED lamp in accordance with claim 4, further including an external source of AC power and a PLC line connecting said source of AC power with said switch, and wherein said control signal path comprises a control signal line wire connected to said PLC line.

8. The LED lamp as set forth in claim 2, wherein said means for controlling includes a timer positioned in said tube in operative signal association with said switch.

9. The LED lamp as set forth in claim 8, further including a manual timer control unit positioned external to said tube in operative signal association with said timer, said manual timer control unit being manually controllable to signal set times to signal said switch to activate to said on mode and to deactivate to said off mode in accordance with said set times.

10. The LED lamp in accordance with claim 9, further including a control signal path from said manual timer control unit to said timer.

11. The LED lamp in accordance with claim 10, wherein said control signal path comprises a control signal line wire.

12. The LED lamp in accordance with claim 10, wherein said control signal path comprises a wireless signal.

13. The LED lamp in accordance with claim 10, further including an external source of AC power and a PLC line connecting said source of AC power with said timer, and wherein said control signal path comprises a control signal line wire connected to said PLC line.

14. The LED lamp in accordance with claim 9, said timer being preset to set times to signal said switch to activate said switch to said switch on mode and to deactivate said switch to said switch off mode in accordance with said set times.

15. The LED lamp in accordance with claim 2, further including an occupancy motion sensor in operative signal association with said switch wherein said sensor sends a signal to said switch to operate said switch to a closed mode when motion is detected in the illumination area of said LED lamp wherein power is transmitted to said LED array to illuminate and further wherein said sensor sends a signal to said switch to operate said switch to an open mode when motion is not detected in the illumination area of said LED lamp wherein power is not transmitted to said LED array and illumination from said LED array ceases.

16. The LED lamp in accordance with claim 15, wherein said motion sensor is positioned within said lamp.

17. The LED lamp in accordance with claim 16, wherein said motion sensor is positioned external to said lamp.

18. The LED lamp in accordance with claim 17, further including a control signal path from said sensor to said switch.

19. The LED lamp in accordance with claim 18, wherein said control signal path comprises a control signal line wire.

20. The LED lamp in accordance with claim 18, wherein said control signal path comprises a wireless signal.

21. The LED lamp in accordance with claim 18, further including an external source of AC power and a PLC line connecting said source of AC power with said switch, and wherein said control signal path comprises a control signal line wire connected to said PLC line.

22. The LED lamp in accordance with claim 1, wherein said means for controlling includes a current driver dimmer positioned in said LED lamp and in operative signal and power association with said at least one LED, said dimmer being for regulating the amount of power provided by said electrical power to said at least one LED.

23. The LED lamp in accordance with claim 22, further including a computer positioned in said lamp in operative power and signal association with said dimmer wherein said computer includes computer controls for signaling said dimmer to regulate the degree of power input to said at least one LED to control the degree of illumination by said at least one LED.

24. The LED lamp in accordance with claim 23, wherein said computer controls include signaling said dimmer to reduce power sent to said at least one LED by a set amount.

25. The LED lamp in accordance with claim 23, wherein said computer controls include signaling said dimmer to provide full power to said at least one LED.

26. The LED lamp in accordance with claim 23, further including a manual control unit for signaling said computer to set power settings for said computer controls, said manual control unit being positioned external to said tube.

27. The LED lamp in accordance with claim 26, wherein said manual control unit is also for signaling said computer relating to preset times relating to activation of said power settings for said computer controls.

28. The LED lamp in accordance with claim 27, further including a control signal

path from said manual control unit to said computer.

29. The LED lamp in accordance with claim 28, wherein said control signal path comprises a control signal line wire.

30. The LED lamp in accordance with claim 28, wherein said control signal path comprises a wireless signal.

31. The LED lamp in accordance with claim 28, further including an external source of AC power and a PLC line connecting said source of AC power with said computer, and wherein said control signal path comprises a control signal line wire connected to said PLC line.

32. The LED lamp in accordance with claim 23, further including a switch in operative signal control with said computer wherein operation of said switch activates said computer to regulate the degree of power input to said at least one LED to control the degree of illumination by said at least one LED.

33. The LED lamp in accordance with claim 32, said switch being positioned external to said tube.

34. The LED lamp in accordance with claim 33, further including a timer in operative signal connection with said switch for providing preset times of operating said switch to send signals to said computer to signal said dimmer to control the degree of power input to said at least one LED.

35. The LED lamp in accordance with claim 34, said timer being positioned external to said tube and being manually operable to set times for operation of said switch to signal said computer at preset times to operate said dimmer to regulate the degree of power input to said at least one LED.

36. The LED lamp in accordance with claim 35, further including a control signal path from said switch to said computer.

37. The LED lamp in accordance with claim 36, wherein said control signal path comprises a control signal line wire.

38. The LED lamp in accordance with claim 36, wherein said control signal path comprises a wireless signal.

39. The LED lamp in accordance with claim 36, further including an external source of AC power and a PLC line connecting said source of AC power with said computer, and wherein said control signal path comprises a control signal line wire connected to said PLC line.

40. The LED lamp in accordance with claim 34, wherein said timer and said switch

are positioned within said tube, said timer being preset for times of operation of said switch between on and off modes for signaling said computer to operate said dimmer at preset times at preset degrees of power input to said at least one LED.

41. The LED lamp in accordance with claim 23, further including an occupancy motion sensor in operative signal connection with said computer.

42. The LED lamp in accordance with claim 41, said sensor being for signaling said computer upon detection of motion and upon lack of detection of motion in the illumination area of said at least one LED.

43. The LED lamp in accordance with claim 41, wherein said sensor is positioned within said tube.

44. The LED lamp in accordance with claim 43, wherein said sensor is positioned external to said tube.

45. The LED lamp in accordance with claim 44, further including a control signal path from said switch to said computer.

46. The LED lamp in accordance with claim 45, wherein said control signal path comprises a control signal line wire.

47. The LED lamp in accordance with claim 45, wherein said control signal path comprises a wireless signal.

48. The LED lamp in accordance with claim 45, further including an external source of AC power and a PLC line connecting said source of AC power with said computer, and wherein said control signal path comprises a control signal line wire connected to said PLC line.

49. The LED lamp in accordance with claim 43, including another LED lamp having another at least one LED positioned in another tube including other electrical power and another ballast assembly and other means for controlling the delivery of said other electrical power from said another ballast assembly to said another LED lamp, said another LED lamp further including another current driver dimmer in operative signal and power association with said another at least one LED, said another dimmer being positioned in said another tube, said another dimmer being for regulating the amount of power provided by said other electrical power to said another at least one LED, said another LED lamp having another sensor positioned in said another tube, said another occupancy motion sensor being for detection of motion and lack of detection of motion in the illumination area of said another at least one LED.

50. The LED lamp in accordance with claim 49, wherein said computer and said



another computer are in network signal communication with said sensor and with said another sensor, wherein sensor data signals received by said computer and by said another computer are continuously compared in accordance with a computer program, wherein said computer signals said dimmer and said another computer signals said another dimmer, and wherein the regulation of power outputs of said dimmer and said another dimmer to said at least one LED and said another at least one LED, respectively, are equal.

51. The LED lamp in accordance with claim 50, wherein the power outputs of said dimmer and said another dimmer are reduced to a less than full power output when both said sensor and said another sensor detect no occupancy motion and wherein the power outputs of both said dimmer and said another dimmer are increased to a full power output when either said sensor or said another sensor detect occupancy motion.

52. The LED lamp in accordance with claim 1, wherein said means for supporting and holding said at least one LED and said LED electrical circuit being positioned within said tube between said tube ends.

53. The LED lamp in accordance with claim 1, wherein said electrical circuit means for providing electrical power from the ballast assembly to said at least one LED includes at least one metal substrate circuit board.

54. The LED lamp in accordance with claim 53, further including means for supporting and holding said at least one LED and said LED electrical circuit, said means for supporting being said at least one metal substrate circuit board positioned within said tube between said tube wall ends.

55. The LED lamp in accordance with claim 1, wherein said at least one LED is a plurality of LEDs.

56. The LED lamp in accordance with claim 1, wherein said at least one LED is an OLED.

57. The LED lamp in accordance with claim 1, wherein said at least one LED is a high-brightness LED.

58. The LED lamp in accordance with claim 22, wherein said current driver dimmer is a plurality of current driver dimmers.

59. The LED lamp in accordance with claim 1, wherein said electrical circuit means further including at least one full wave bridge rectifier for converting AC voltage received from said ballast assembly to DC voltage.

60. The LED lamp in accordance with claim 59, further including at least one non-polarized capacitor in electrical series communication with said ballast opposed electrical

contacts.

61. The LED lamp in accordance with claim 60, further including at least one resistor in electrical series communication with said ballast opposed electrical contacts.

62. The LED lamp in accordance with claim 61, further including at least one diode in electrical parallel communication with said ballast opposed electrical contacts.

63. The LED lamp in accordance with claim 62, wherein said at least one diode is at least one zener diode.

64. The LED lamp in accordance with claim 1, wherein said means for suppressing ballast voltage includes at least one voltage surge absorber (ZNR) in electrical parallel communication with said ballast opposed electrical contacts.

65. The LED lamp in accordance with claim 1, wherein said means for suppressing ballast voltage includes at least one movistor (MOV) in electrical parallel communication with said ballast opposed electrical contacts.

66. The LED lamp in accordance with claim 1, wherein said means for suppressing ballast voltage includes at least one varistor in electrical parallel communication with said ballast opposed electrical contacts.

67. The LED lamp in accordance with claim 1, further including at least one filter capacitor in parallel with said at least one LED electrical string.

68. The LED lamp in accordance with claim 23, wherein said computer is a logic gate array positioned in said lamp in operative power and signal association with said dimmer.

69. The LED lamp in accordance with claim 8, wherein said timer is a computer positioned in said tube in operative signal association with said switch.